September 2011

Volume 18
Number 9

MSMR

MEDICAL SURVEILLANCE MONTHLY REPORT

A publication of the Armed Forces Health Surveillance Center

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
SEP 2011		**00-00-2011 to 00-00-2011**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Medical Surveillance Monthly Report	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Armed Forces Health Surveillance Center,11800 Tech Road, Suite 220 (MCAF-CS),Silver Spring,MD,20904**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**Same as Report (SAR)**	**20**	

Associations between Repeated Deployments to Iraq (OIF/OND) and Afghanistan (OEF) and Post-deployment Illnesses and Injuries, Active Component, U.S. Armed Forces, 2003-2010

Part II. Mental Disorders, by Gender, Age Group, Military Occupation, and "Dwell Times" Prior to Repeat (Second through Fifth) Deployments

Since 2001, 1,347,731 active component U.S. military members deployed in support of operations in Afghanistan and Iraq. This report documents the percentages of deployers who were diagnosed with selected mental disorders in relation to the number (first through fifth) and lengths of "dwell times" prior to such deployments. In general, larger percentages of deployers were diagnosed with PTSD and anxiety-related disorders after second/third than first deployments. After first and repeat deployments, relatively more medical than other occupational group members were diagnosed with PTSD. In general, larger percentages of deployers were diagnosed with alcohol/drug disorders and psychosocial problems after first than repeat deployments; and among deployers younger than 25 years, in combat-specific occupations, and females, every disorder (except PTSD and anxiety-related) affected larger percentages after first than repeat deployments. For most disorders, the longer the "dwell times" prior to deployments, the larger the percentages diagnosed with the conditions after the deployments. The findings should be interpreted with consideration of limitations of the analysis.

Since October 2001, the U.S. military has conducted combat operations in Afghanistan (Operation Enduring Freedom [OEF]) and Iraq (Operations Iraqi Freedom/New Dawn [OIF/OND]). During that time, many U.S. military members have deployed to OEF/OIF/OND multiple times; such a high operational tempo over such a long period is unprecedented for the U.S. military.

Military and political leaders, medical researchers and policy makers, health care providers, family members of deployment veterans, and many others have expressed concerns that increasing numbers of combat deployments and shorter "dwell times" between deployments may increase the rates, severities, and medical and social impacts of mental disorders.[1] Some studies of deployment veterans have documented higher rates of post-traumatic stress disorder (PTSD), depression, and other psychological problems (e.g., anxiety, acute stress) among repeat compared to first time deployers.[2,3] Other studies have found little evidence of causal relationships between repeat deployments and mental health effects (e.g., suicide).[1,4] Interpretations of such findings should consider that service members who have clinically significant adverse psychological effects due to deployment experiences are less likely than their counterparts to deploy again; as a result, repeat deployers may be more psychologically "resilient" than their never or less frequently deployed counterparts.

In the first of this series of reports regarding associations between repeat deployments and illnesses and injuries in general, "adjustment reactions" (including post-traumatic stress disorder) and "anxiety-related disorders" were among the conditions much more frequently diagnosed among males after second and third compared to first combat deployments. Among females, no mental disorders were among the conditions much more frequently diagnosed after repeated compared to first deployments.[5]

This report documents the proportions of deployers who received diagnoses of selected mental disorders within one year after returning from first through fifth OEF/OIF/OND deployments. The report summarizes the experiences of male and female deployers in relation to their ages, military occupations, and "dwell times" before repeat deployments (i.e., days from the end of prior to subsequent OEF/OIF/OND deployments).

METHODS

The surveillance period was 1 October 2001 to 31 December 2010. The surveillance population included all individuals who served in the active component of the U.S. Armed Forces and returned from an OEF/OIF/OND deployment anytime during the surveillance period.

Endpoints of analyses were mental disorders and psychosocial problems (as defined by numeric and "V" and "E" codes of the International Classification of Diseases, 9th Revision, Clinical Modifications [ICD-9-CM]) that were reported during hospitalizations and ambulatory visits in U.S. military and civilian (reimbursed care) medical treatment facilities within one year after service members' first through fifth OEF/OIF/OND deployments. ICD-9-CM codes considered indicators of endpoints of analyses were: adjustment reaction: ICD-9-CM 309.0-.2; 309.21-.29; 309.3-.8; 309.8x (except 309.81 post-traumatic stress disorder [PTSD]); 309.9; post-traumatic stress disorder (PTSD): ICD-9-CM 309.81; alcohol, drug dependence/abuse ("alcohol/drug disorders"): ICD-9-CM 303.xx, 304.xx, 305.xx (except 305.1 tobacco use disorder); anxiety, phobic, obsessive-compulsive disorders ("anxiety-related disorders"): ICD-9-CM 300.0, 300.00-300.09; 300.2, 300.20-300.29; 300.3, 300.30-300.39; major depressive, episodic mood, dysthymic disorders ("depressive disorders"): ICD-9-CM 296.2, 296.20-.25, 296.3, 296.30-.35, 296.5,

296.50-.55, 296.9, 300.4, 311, 311.0; suicidal ideation/self-inflicted injury: ICD-9-CM v62.84, E950.0-E959.9; and counseling for mental, behavioral, psychosocial problems ("psychosocial problems"): ICD-9-CM v40, v40.2, .3, .9; v62, v62.0-.9 (except v62.6); v62.21, .22, .29; v62.81, .82, .89; 995.80-.85.

Indicator diagnoses were ascertained from the first two diagnoses reported on records of hospitalizations and ambulatory visits during relevant post-deployment periods. Regardless of the number of mental disorder-related encounters during each post-deployment period, each deployer was counted as a case of each disorder only once per post-deployment period.

Each post-deployment period was characterized by the number of OEF/OIF/OND deployments of each deployer, i.e., post-deployment periods 1 through 5 were defined as 0-12 months following the first through fifth OEF/OIF/OND deployments, respectively, of each deployer. Each post-deployment period was also characterized by the gender, age group, and military occupational group of each deployer and the "dwell time" prior to each repeat deployment. Dwell times were categorized by the number of days from the end of the preceding to the start of each second through fifth deployment. If "dwell times" between consecutive deployments were less than 30 days, the deployments were considered single deployments for analysis purposes.

The primary summary measure used for analyses was the "percent affected"; the percent affected was the number of service members in each post-deployment cohort who received a case-defining mental disorder diagnosis within one year after returning from a first through fifth OEF/OIF/OND deployment times 100 divided by the number of service members in the respective post-deployment cohort.

RESULTS

During the surveillance period, 1,190,354 male and 154,314 female active component members deployed at least once in support of OEF/OIF/OND. Of deployers overall, 42.2 percent, 12.9 percent, 3.7 percent, and 1.3 percent of males and 31.0 percent, 7.3 percent, 1.6 percent, and 0.5 percent of females deployed two to five times, respectively **(Table 1)**.

GENDER

Among males, no mental disorders consistently increased in the percentages affected by them with each additional OEF/OIF/OND deployment. Larger percentages of males were diagnosed with PTSD after second through fourth deployments, and with adjustment reactions, anxiety-related disorders, and depressive disorders after second and third deployments, than after first deployments. Smaller percentages of males were diagnosed with alcohol/drug disorders, psychosocial problems, and suicide ideation/self-inflicted injuries after all repeat (second through fifth) than first deployments **(Table 1)**.

As among males, among females, no mental disorders consistently increased in the percentages affected by them with each additional deployment; also as among males, relatively more females were diagnosed with PTSD after second through fourth than first deployments. In contrast to males, the percentages of females diagnosed with depressive disorders, alcohol/drug disorders, and suicide ideation/self-inflicted injuries consistently declined from first through fifth deployments; and the percentages diagnosed with adjustment reactions, anxiety-related disorders, and psychosocial problems declined fairly steadily (but not monotonically) from first through fifth deployments **(Table 1)**.

AGE GROUP

Among deployers younger than 25 years, the percentages affected by all mental disorders of interest (except PTSD and anxiety-related) were larger after first than any repeat (second through fifth) deployments. Among these relatively young deployers, larger percentages were diagnosed with PTSD after second and third, and with anxiety-related disorders after second, than first deployments **(Table 1).**

Among deployers 25 to 29 years old, larger percentages were diagnosed with PTSD after second through fourth, and with adjustment reactions, anxiety-related disorders, depressive disorders, and suicide ideation/self-inflicted injuries after second and third, than first deployments. Larger percentages of 25-29 year old deployers were diagnosed with alcohol/drug disorders and psychosocial problems after first than any repeat deployments **(Table 1).**

Among deployers 30 years and older, larger percentages were diagnosed with PTSD, adjustment reactions, anxiety-related disorders, and suicide ideation/self-inflicted injuries after second through fourth, with depressive disorders after second and third, and with alcohol/drug disorders after third, than first deployments. Of all conditions, only psychosocial problems were reported relatively more frequently after first than any repeat deployments **(Table 1).**

MILITARY OCCUPATION

Among deployers in combat-specific occupations (e.g., infantry, armor, artillery), larger percentages were diagnosed with PTSD and anxiety-related disorders after second and third than first deployments; for all other conditions, larger percentages were affected after first than any repeat deployments **(Table 1).**

Among deployers in health care occupations, larger percentages were diagnosed with PTSD after second through fourth, with anxiety-related disorders after second and third, and with adjustment reactions and depressive disorders after third, than first deployments. Relatively more medical workers were diagnosed with alcohol/drug disorders, psychosocial problems, and suicide ideation/self-inflicted injuries after first than any repeat deployments **(Table 1).**

Among deployers in non-combat-specific and non-medical ("other") military occupations, larger percentages were diagnosed with PTSD after second through fifth, with anxiety-related disorders after second through fourth, with adjustment reactions after second and third, and with depressive disorders after third, than first deployments. Deployers in "other" occupations were relatively more frequently diagnosed with alcohol/drug disorders, psychosocial problems, and suicide ideation/self-inflicted injuries after first than any repeat deployments **(Table 1).**

TABLE 1. Number and percentage of deployers diagnosed with selected mental conditions within one year after first through fifth OEF, OIF, OND deployments, by gender and age of deployers, active component, U.S. Armed Forces, 2003-2010

			Adjustment reaction			Post-traumatic stress disorder (PTSD)			Alcohol/drug dependence/abuse		
	Deployment number	No. of deployers	No. with diagnosis	% with diagnosis	% affected relative to after first deployment	No. with diagnosis	% with diagnosis	% affected relative to after first deployment	No. with diagnosis	% with diagnosis	% affected relative to after first deployment
Gender											
Female	First	154,314	10,610	6.88	Ref	2,585	1.68	Ref	2,752	1.78	Ref
	Second	47,832	2,935	6.14	0.89	901	1.88	1.12	624	1.30	0.73
	Third	11,215	699	6.23	0.91	246	2.19	1.31	101	0.90	0.50
	Fourth	2,489	144	5.79	0.84	47	1.89	1.13	17	0.68	0.38
	Fifth	720	23	3.19	0.46	10	1.39	0.83	2	0.28	0.16
Male	First	1,190,354	48,145	4.04	Ref	18,517	1.56	Ref	38,505	3.23	Ref
	Second	502,510	20,618	4.10	1.01	12,060	2.40	1.54	11,805	2.35	0.73
	Third	153,892	6,591	4.28	1.06	4,146	2.69	1.73	2,858	1.86	0.57
	Fourth	44,410	1,439	3.24	0.80	834	1.88	1.21	608	1.37	0.42
	Fifth	15,966	346	2.17	0.54	153	0.96	0.62	167	1.05	0.32
Age group											
<25	First	731,292	37,029	5.06	Ref	13,173	1.80	Ref	32,145	4.40	Ref
	Second	221,623	9,715	4.38	0.87	5,811	2.62	1.46	7,766	3.50	0.80
	Third	41,166	1,664	4.04	0.80	1,099	2.67	1.48	1,184	2.88	0.65
	Fourth	7,742	233	3.01	0.59	128	1.65	0.92	185	2.39	0.54
	Fifth	2,363	44	1.86	0.37	15	0.63	0.35	51	2.16	0.49
25-29	First	260,541	10,884	4.18	Ref	3,813	1.46	Ref	5,744	2.20	Ref
	Second	141,210	6,591	4.67	1.12	3,450	2.44	1.67	2,901	2.05	0.93
	Third	50,493	2,547	5.04	1.21	1,511	2.99	2.04	1,033	2.05	0.93
	Fourth	14,928	564	3.78	0.90	310	2.08	1.42	226	1.51	0.69
	Fifth	5,163	119	2.30	0.55	47	0.91	0.62	58	1.12	0.51
30+	First	352,835	10,842	3.07	Ref	4,116	1.17	Ref	3,368	0.95	Ref
	Second	187,509	7,247	3.86	1.26	3,700	1.97	1.69	1,762	0.94	0.98
	Third	73,448	3,079	4.19	1.36	1,782	2.43	2.08	742	1.01	1.06
	Fourth	24,229	786	3.24	1.06	443	1.83	1.57	214	0.88	0.93
	Fifth	9,160	206	2.25	0.73	101	1.10	0.95	60	0.66	0.69
Military occupation											
Combat	First	353,391	15,832	4.48	Ref	7,696	2.18	Ref	13,514	3.82	Ref
	Second	162,982	6,885	4.22	0.94	5,058	3.10	1.43	4,356	2.67	0.70
	Third	53,238	2,028	3.81	0.85	1,524	2.86	1.31	1,010	1.90	0.50
	Fourth	17,650	446	2.53	0.56	311	1.76	0.81	215	1.22	0.32
	Fifth	7,397	101	1.37	0.30	49	0.66	0.30	63	0.85	0.22
Health care	First	79,162	5,374	6.79	Ref	2,534	3.20	Ref	1,837	2.32	Ref
	Second	24,034	1,632	6.79	1.00	1,216	5.06	1.58	523	2.18	0.94
	Third	5,571	416	7.47	1.10	356	6.39	2.00	94	1.69	0.73
	Fourth	1,186	59	4.97	0.73	53	4.47	1.40	17	1.43	0.62
	Fifth	359	7	1.95	0.29	5	1.39	0.44	2	0.56	0.24
Other	First	912,115	37,549	4.12	Ref	10,872	1.19	Ref	25,906	2.84	Ref
	Second	363,326	15,036	4.14	1.01	6,687	1.84	1.54	7,550	2.08	0.73
	Third	106,298	4,846	4.56	1.11	2,512	2.36	1.98	1,855	1.75	0.61
	Fourth	28,063	1,078	3.84	0.93	517	1.84	1.55	393	1.40	0.49
	Fifth	8,930	261	2.92	0.71	109	1.22	1.02	104	1.16	0.41

TABLE 1. Number and percentage of deployers diagnosed with selected mental conditions within one year after first through fifth OEF, OIF, OND deployments, by gender and age of deployers, active component, U.S. Armed Forces, 2003-2010

Anxiety-related disorder			Depressive disorder			Psychosocial problems			Suicide ideation, self-inflicted injury		
No. with diagnosis	% with diagnosis	% affected relative to after first deployment	No. with diagnosis	% with diagnosis	% affected relative to after first deployment	Number with No.	% with diagnosis	% affected relative to after first deployment	No. with diagnosis	% with diagnosis	% affected relative to after first deployment
5,591	3.62	Ref	10,600	6.87	Ref	7,339	4.76	Ref	637	0.41	Ref
1,657	3.46	0.96	3,057	6.39	0.93	1,905	3.98	0.84	155	0.32	0.79
412	3.67	1.01	675	6.02	0.88	402	3.58	0.75	25	0.22	0.54
83	3.33	0.92	130	5.22	0.76	104	4.18	0.88	4	0.16	0.39
18	2.50	0.69	29	4.03	0.59	22	3.06	0.64	0	0.00	0.00
23,492	1.97	Ref	32,992	2.77	Ref	36,366	3.06	Ref	3,210	0.27	Ref
11,443	2.28	1.15	13,958	2.78	1.00	12,383	2.46	0.81	1,030	0.20	0.76
3,808	2.47	1.25	4,440	2.89	1.04	3,486	2.27	0.74	319	0.21	0.77
822	1.85	0.94	959	2.16	0.78	843	1.90	0.62	69	0.16	0.58
200	1.25	0.63	230	1.44	0.52	278	1.74	0.57	20	0.13	0.46
16,703	2.28	Ref	25,295	3.46	Ref	26,380	3.61	Ref	2,923	0.40	Ref
5,188	2.34	1.02	6,783	3.06	0.88	5,960	2.69	0.75	616	0.28	0.70
852	2.07	0.91	1,088	2.64	0.76	975	2.37	0.66	103	0.25	0.63
124	1.60	0.70	130	1.68	0.49	174	2.25	0.62	11	0.14	0.36
23	0.97	0.43	26	1.10	0.32	43	1.82	0.50	3	0.13	0.32
5,732	2.20	Ref	8,340	3.20	Ref	8,538	3.28	Ref	546	0.21	Ref
3,672	2.60	1.18	4,550	3.22	1.01	3,985	2.82	0.86	332	0.24	1.12
1,519	3.01	1.37	1,731	3.43	1.07	1,370	2.71	0.83	133	0.26	1.26
302	2.02	0.92	369	2.47	0.77	358	2.40	0.73	31	0.21	0.99
67	1.30	0.59	82	1.59	0.50	99	1.92	0.59	8	0.15	0.74
6,648	1.88	Ref	9,957	2.82	Ref	8,787	2.49	Ref	378	0.11	Ref
4,240	2.26	1.20	5,682	3.03	1.07	4,343	2.32	0.93	237	0.13	1.18
1,849	2.52	1.34	2,296	3.13	1.11	1,543	2.10	0.84	108	0.15	1.37
479	1.98	1.05	590	2.44	0.86	415	1.71	0.69	31	0.13	1.19
128	1.40	0.74	151	1.65	0.58	158	1.72	0.69	9	0.10	0.92
7,359	2.08	Ref	9,913	2.81	Ref	12,807	3.62	Ref	1,141	0.32	Ref
3,774	2.32	1.11	4,200	2.58	0.92	4,191	2.57	0.71	371	0.23	0.71
1,189	2.23	1.07	1,269	2.38	0.85	1,172	2.20	0.61	105	0.20	0.61
241	1.37	0.66	253	1.43	0.51	300	1.70	0.47	15	0.08	0.26
50	0.68	0.32	67	0.91	0.32	88	1.19	0.33	7	0.09	0.29
3,046	3.85	Ref	4,404	5.56	Ref	3,364	4.25	Ref	231	0.29	Ref
994	4.14	1.07	1,313	5.46	0.98	871	3.62	0.85	68	0.28	0.97
226	4.06	1.05	331	5.94	1.07	173	3.11	0.73	13	0.23	0.80
40	3.37	0.88	48	4.05	0.73	26	2.19	0.52	3	0.25	0.87
4	1.11	0.29	9	2.51	0.45	4	1.11	0.26	1	0.28	0.95
18,678	2.05	Ref	29,275	3.21	Ref	27,534	3.02	Ref	2,475	0.27	Ref
8,332	2.29	1.12	11,502	3.17	0.99	9,226	2.54	0.84	746	0.21	0.76
2,805	2.64	1.29	3,515	3.31	1.03	2,543	2.39	0.79	226	0.21	0.78
624	2.22	1.09	788	2.81	0.87	621	2.21	0.73	55	0.20	0.72
164	1.84	0.90	183	2.05	0.64	208	2.33	0.77	12	0.13	0.50

After first through third deployments, each mental disorder except alcohol/drug disorders and suicide ideation/self-inflicted injury was diagnosed more frequently among those in health care than combat-specific or "other" military occupations **(Figure 1a-g)**. In general, relationships between percentages affected by various disorders and number of deployments were similar across occupational groups. For example, in each occupational group, for most conditions, the percentages affected by the conditions increased or were stable from first through third deployments and then declined; and in each occupational group, the percentages diagnosed with alcohol/drug disorders, psychosocial problems, and suicide ideation/self-inflicted injuries generally declined with increasing deployments **(Figure 1a-g)**.

DWELL TIMES PRIOR TO REPEAT DEPLOYMENTS

In general, after repeat (second through fifth) deployments, the percentages of deployers diagnosed with all of the mental disorders considered here (except alcohol/drug disorders and psychosocial problems) increased as dwell times preceding the deployments lengthened. The general relationships between percentages affected by various mental disorders after deployments and the lengths of dwell times prior to the deployments were similar among males and females **(Table 2, Figure1a-g).**

EDITORIAL COMMENT

This report provides an overview of associations between the percentages of deployers who were diagnosed with various mental disorders within one year after returning from OEF/OIF/OND deployments, the number of such deployments, and the lengths of dwell times prior to the deployments. The report summarizes these associations in relation to the genders, ages, and military occupations of the deployers.

In every gender, age, and military occupational subgroup considered here, larger percentages of deployers were diagnosed with PTSD and anxiety-related disorders after second and/or third than first deployments; of note, the percentages diagnosed with PTSD were sharply lower after fourth and fifth than third deployments. Reger and colleagues reported an increase of positive screens for PTSD (but not other mental disorders) after second compared to first OIF deployments (based on responses to post-deployment mental health questionnaires).[2] Similarly, Ghaed and colleagues reported that PTSD was more prevalent among repeat than first time deployers (based on preliminary analysis of Theater Mental Health Encounter Data [TMHED]).[3] In contrast, in their study of nearly 10,000 British soldiers, Fear and colleagues found no associations between the number of Iraq/Afghanistan deployments and prevalences of probable PTSD or any other mental disorders (based on

TABLE 2. Number and percentage of deployers diagnosed with selected mental disorders after second through fifth OEF/OIF/OND deployments, by "dwell times" between prior and specified repeat deployments, active component, U.S. Armed Forces, 2003-2010

			Adjustment reaction			Post-traumatic stress disorder (PTSD)			Alcohol dependence/abuse		
Deployment number	Dwell time before deployment	No. of deployers	No. with diagnosis	% with diagnosis	% affected relative to shortest dwell time	No. with diagnosis	% with diagnosis	% affected relative to shortest dwell time	No. with diagnosis	% with diagnosis	% affected relative to shortest dwell time
Second											
	<6 months	82,294	2,715	3.30	Ref	1,213	1.47	Ref	1,918	2.33	Ref
	6-12 months	137,223	4,270	3.11	0.94	3,097	2.26	1.53	3,563	2.60	1.11
	12-18 months	125,330	6,276	5.01	1.52	3,348	2.67	1.81	3,127	2.50	1.07
	>18 months	205,495	10,292	5.01	1.52	5,303	2.58	1.75	3,821	1.86	0.80
Third											
	<6 months	34,055	869	2.55	Ref	461	1.35	Ref	521	1.53	Ref
	6-12 months	42,067	1,276	3.03	1.19	838	1.99	1.47	750	1.78	1.17
	12-18 months	38,590	2,391	6.20	2.43	1,387	3.59	2.66	825	2.14	1.40
	>18 months	50,395	2,754	5.46	2.14	1,706	3.39	2.50	863	1.71	1.12
Fourth											
	<6 months	15,374	322	2.09	Ref	175	1.14	Ref	190	1.24	Ref
	6-12 months	12,731	343	2.69	1.29	194	1.52	1.34	151	1.19	0.96
	12-18 months	9,639	477	4.95	2.36	271	2.81	2.47	155	1.61	1.30
	>18 months	9,155	441	4.82	2.30	241	2.63	2.31	129	1.41	1.14
Fifth											
	<6 months	7,411	123	1.66	Ref	48	0.65	Ref	71	0.96	Ref
	6-12 months	4,773	108	2.26	1.36	43	0.90	1.39	54	1.13	1.18
	12-18 months	2,366	75	3.17	1.91	38	1.61	2.48	26	1.10	1.15
	>18 months	2,136	63	2.95	1.78	34	1.59	2.46	18	0.84	0.88

questionnaire responses).[4] Because the current report is based on records of medical encounters of all recently returned active component deployment veterans (rather than questionnaire responses of selected study subjects), the finding of higher percentages of diagnoses of PTSD in all gender, age, and military occupational subgroups after second and third than after first deployments is noteworthy.

In this analysis, higher percentages of deployers in health care than combat-specific or other military occupations were diagnosed with PTSD. The finding is not particularly surprising because health care workers may have better access to mental health services and may perceive less stigma from seeking and receiving mental health care than those in other military occupations. In addition, the percentages of deployers diagnosed with PTSD increased much more sharply from first through third deployments among health care than other occupational group members. In this regard, deployers in combat-specific occupations (and some health care workers such as combat medics) may have multiple, intermittent, intensive exposures to personally life threatening experiences (e.g., snipers, rockets, mortars, ambushes, IEDs). In comparison, health care workers may be less frequently and intensively personally threatened while deployed; however, they may be nearly continuously exposed to the traumatic injuries, suffering, fear, grief, and death of others; and in many cases, their best efforts to intervene may be unsuccessful. Increasing risks of PTSD after second and third deployments suggest that repeated, intense, homotypic psychological traumas during multiple wartime deployments – particularly among combat troops (" battle fatigue") and health care workers ("compassion fatigue") – may have cumulative and persistent psychological effects.

Among deployers 25 years and older, most mental disorders examined for this report (except alcohol/drug disorders and psychosocial problems) affected larger percentages after second and third than first deployments. The finding is consistent with those of the most recent Joint Mental Health Advisory Team (MHAT) survey of soldiers and Marines in Iraq and Afghanistan; the 2010 MHAT report documented significantly more psychological problems among those on third and fourth compared to first or second deployments;[6] in general, soldiers and Marines on third and fourth deployments are older than their less frequently deployed counterparts.

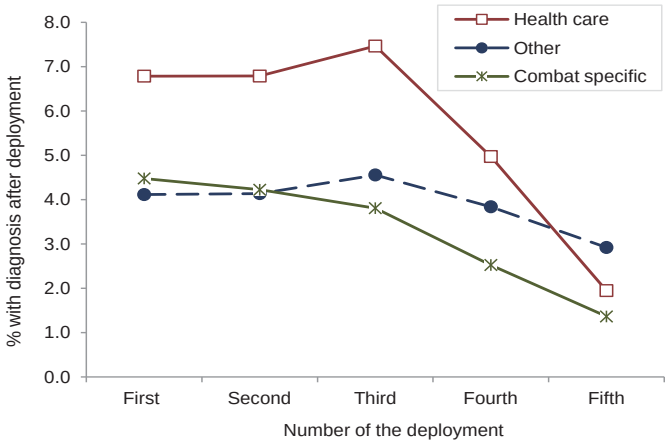
Among deployers who were younger than 25 years, in combat-specific occupations, and female, most disorders examined here (except PTSD and anxiety-related) were diagnosed relatively more frequently after first than repeat deployments. Compared to their respective counterparts, service members who are young, female, and in combat-specific occupations may leave military service at higher rates after their first wartime deployments—particularly

TABLE 2. Number and percentage of deployers diagnosed with selected mental disorders after second through fifth OEF/OIF/OND deployments, by "dwell times" between prior and specified repeat deployments, active component, U.S. Armed Forces, 2003-2010

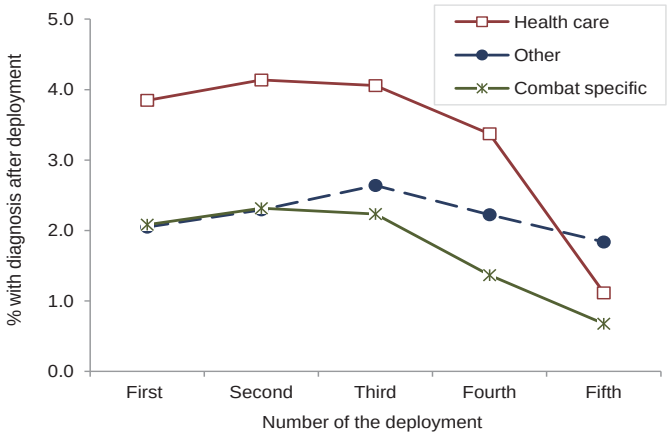
Anxiety-related disorder			Depressive disorder			Psychosocial problems			Suicide ideation, self-inflicted injury		
No. with diagnosis	% with diagnosis	% affected relative to shortest dwell time	No. with diagnosis	% with diagnosis	% affected relative to shortest dwell time	No. with diagnosis	% with diagnosis	% affected relative to shortest dwell time	No. with diagnosis	% with diagnosis	% affected relative to shortest dwell time
1,290	1.57	Ref	2,071	2.52	Ref	2,511	3.05	Ref	104	0.13	Ref
2,625	1.91	1.22	3,598	2.62	1.04	2,870	2.09	0.69	246	0.18	1.42
3,454	2.76	1.76	4,199	3.35	1.33	3,602	2.87	0.94	336	0.27	2.12
5,731	2.79	1.78	7,147	3.48	1.38	5,305	2.58	0.85	499	0.24	1.92
495	1.45	Ref	625	1.84	Ref	607	1.78	Ref	35	0.10	Ref
782	1.86	1.28	971	2.31	1.26	757	1.80	1.01	81	0.19	1.87
1,319	3.42	2.35	1,570	4.07	2.22	1,128	2.92	1.64	102	0.26	2.57
1,624	3.22	2.22	1,949	3.87	2.11	1,396	2.77	1.55	126	0.25	2.43
166	1.08	Ref	211	1.37	Ref	254	1.65	Ref	15	0.10	Ref
192	1.51	1.40	240	1.89	1.37	215	1.69	1.02	18	0.14	1.45
276	2.86	2.65	348	3.61	2.63	256	2.66	1.61	20	0.21	2.13
271	2.96	2.74	290	3.17	2.31	222	2.42	1.47	20	0.22	2.24
82	1.11	Ref	84	1.13	Ref	105	1.42	Ref	1	0.01	Ref
59	1.24	1.12	74	1.55	1.37	93	1.95	1.38	9	0.19	13.97
38	1.61	1.45	56	2.37	2.09	62	2.62	1.85	4	0.17	12.53
39	1.83	1.65	45	2.11	1.86	40	1.87	1.32	6	0.28	20.82

FIGURE 1. Percentage of deployers who were diagnosed with selected mental disorders within one year after OEF/OIF/OND deployments, by deployment number and military occupational group, active component, U.S. Armed Forces, 2003-2010

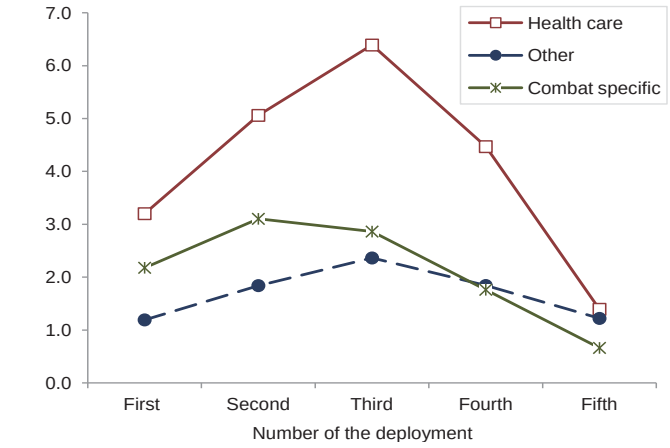
a. Adjustment reaction



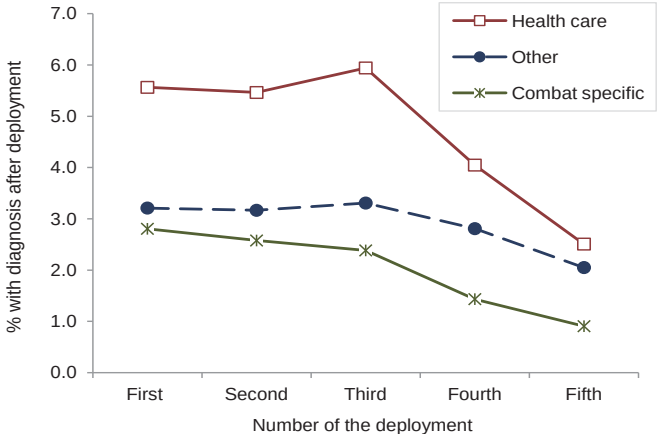
d. Anxiety-related disorder



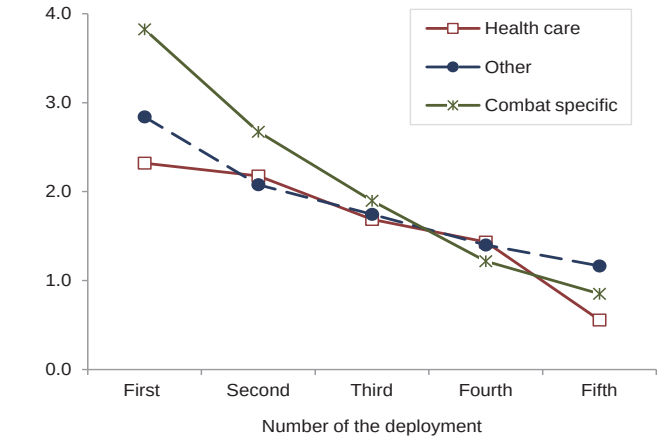
b. Post-traumatic stress disorder (PTSD)



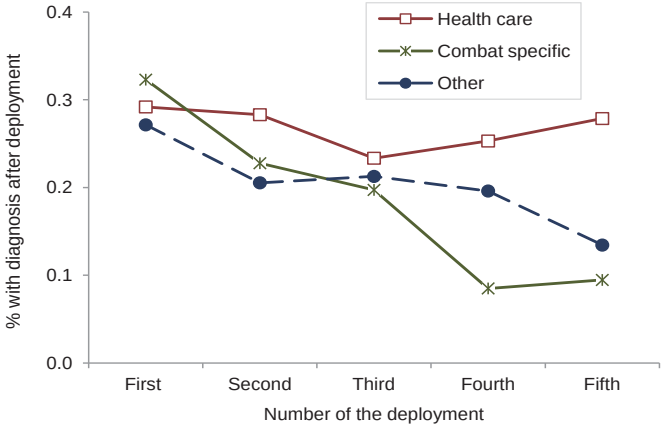
e. Depressive disorder



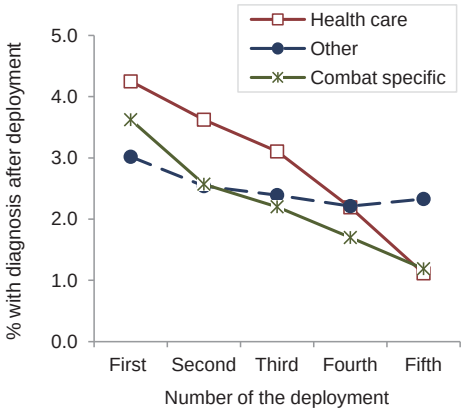
c. Alcohol dependence/abuse



f. Suicide ideation, self-inflicted injury



g. Psychosocial problems



if they were psychologically traumatized during, and/or disabled by a mental disorder after returning from, their first deployments.

Also, in nearly every demographic and military occupational subgroup examined here, larger percentages of deployers were diagnosed with alcohol/drug disorders and psychosocial problems after first than repeat deployments. Alcohol/drug disorders and psychosocial problems may be indicators of psychological effects of wartime service; service members affected by such conditions may be more likely than their counterparts to leave active service before they deploy again. Thus, as a group, service members who have deployed multiple times may be more psychologically resilient to deployment stress-related symptoms than their never or less frequently deployed counterparts. The findings of this report in relation to the relatively high risks of mental disorders after first deployments reiterate the importance of providing mental health-related interventions during and closely following the first wartime deployments of service members.

Perhaps, the most unexpected finding of this analysis was the consistency of the relationships between the percentages of deployers who were diagnosed with various mental disorders (except alcohol/drug disorders and psychosocial problems) after second through fifth deployments and the lengths of dwell times prior to such deployments. For most conditions, the longer the dwell times prior to repeat deployments, the larger the percentages diagnosed with the conditions after the deployments. In considering the implications of this finding, it may be useful to think of dwell times in relation to the transition/readjustment periods that inevitably follow combat deployments.[7] Based on extensive clinical and research experiences, Hoge has observed that "warriors and their family members are often surprised at how difficult the transition period is after coming back from a combat deployment."[7 (p. xviii)] Depending on factors such as personal circumstances (e.g., marital status, number and ages of children) and wartime experiences, post-deployment transition/readjustment periods can markedly vary in regard to the natures, magnitudes, durations, and effects of transition/readjustment-related stresses. With long dwell times between repeat deployments, deployers may complete the work of transition/readjustment from deployed to non-deployed status before deploying again – and then transitioning/readjusting again from non-deployed to "warrior" status. For some service members, short dwell times that interrupt transitions/readjustments from deployed to non-deployed status between repeat deployments may be less psychologically traumatic.

Also, some service members are temporarily unable to redeploy while being treated for or recuperating from medical conditions (including mental disorders) that are associated with recent deployments. Such individuals may have relatively long dwell times before deploying again; in addition, they may be at higher risk of exacerbations or recurrences of their conditions during and following subsequent deployments.[8] In a special case of such a circumstance, some female service members experience pregnancy, childbirth, and maternity leave during dwell times between deployments. In such situations, dwell times prior to repeat deployments may be relatively long, and risks of mental disorders during and following such deployments may be increased. In a recent *MSMR* report, Danielson documented that 6.1 percent of 8,524 women who deployed after the births of their first children received at least one mental health diagnosis within six months after returning from deployment; their most frequent post-deployment mental disorder diagnoses were adjustment reactions and depressive and anxiety disorders.[9] In the current report, these conditions were diagnosed particularly frequently among females after deployments preceded by relatively long dwell times. Clearly, the effects of dwell times in relation to repeat wartime deployments require much more investigation.

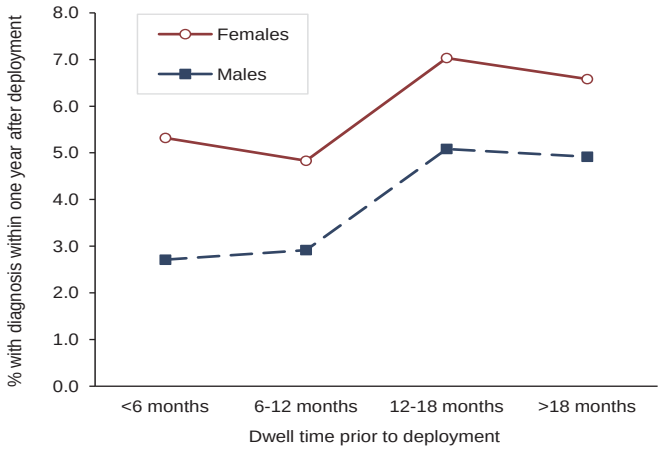
There are significant limitations to this report that should be considered when interpreting the results. For example, the demographic and military characteristics of initial and repeat deployers are markedly different; in addition, there are differences in the demographic and military characteristics of deployers in relation to lengths of dwell times between deployments. The results reported here do not account for the effects of these differences; such effects could alter some of the findings of this report. More detailed analyses of the effects of multiple deployments and lengths of dwell times between deployments are indicated to isolate the effects of these factors from the effects of multiple confounding factors.

Also, the summary measure used for comparisons in this report was the percent of deployers diagnosed with various mental disorders within one year after returning from deployment. As such, deployers who left active service within the year after returning from a deployment had shorter post-deployment follow-up times than others. It is unlikely, however, that the overall results would be significantly changed by accounting for the shorter lengths of some post-deployment follow-ups. For example, in a separate analysis (data not shown), relationships between number of deployments and percentages affected by PTSD (which do not account for follow-up times) and rates of PTSD (which do account for follow-up times) were very similar.

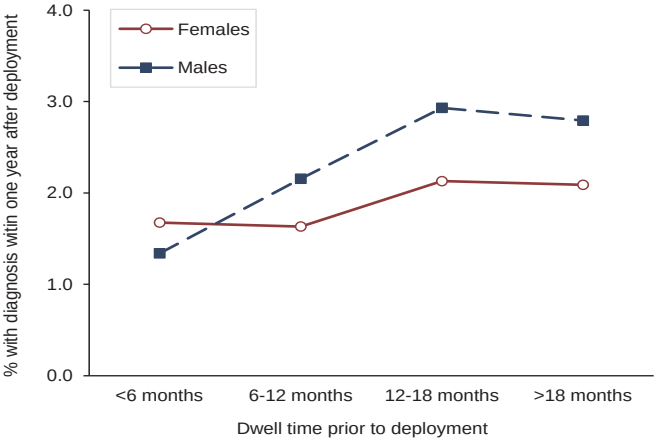
Also, case-defining diagnoses for this report were ascertained from ICD-9-CM diagnostic codes that were reported on administrative records of hospitalizations and ambulatory visits in fixed (e.g., not deployed, at sea) medical treatment facilities. The mental disorders of interest

FIGURE 2. Percentage of repeat (second through fifth time) OEF/OIF/OND deployers diagnosed with selected mental disorders after deployment, by "dwell times" prior to deployments, by gender, active component, U.S. Armed Forces, 2003-2010

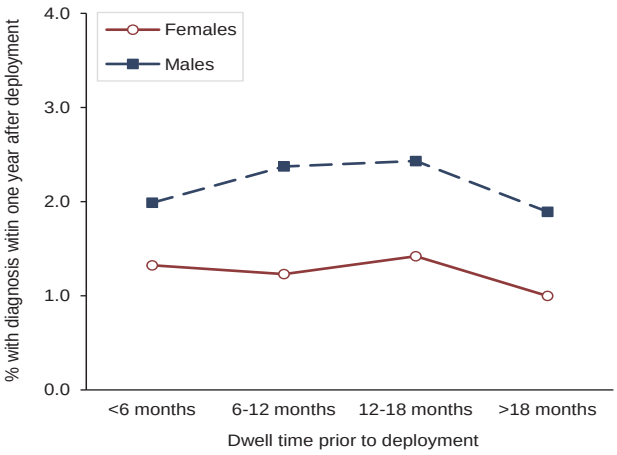
a. Adjustment reaction



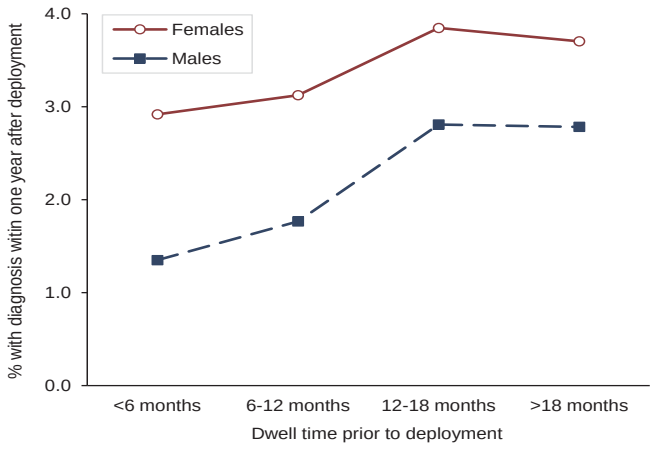
b. Post-traumatic stress disorder (PTSD)



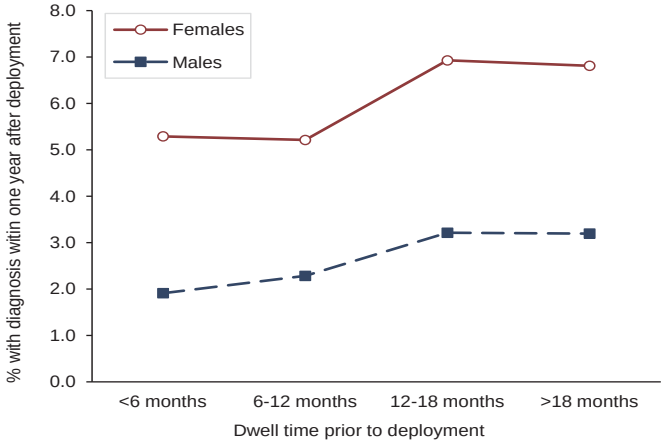
c. Alcohol/substance disorder



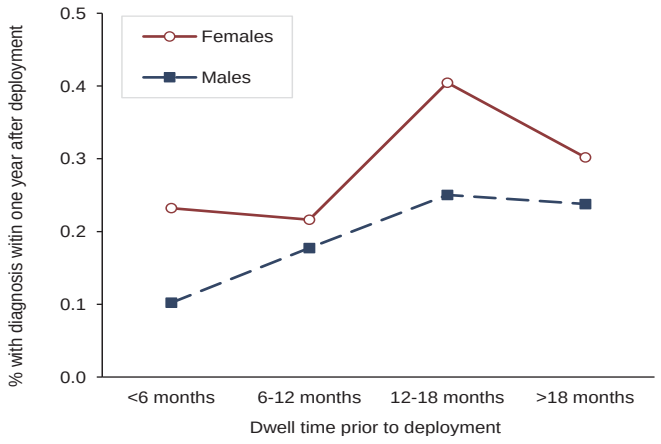
d Anxiety-related disorder



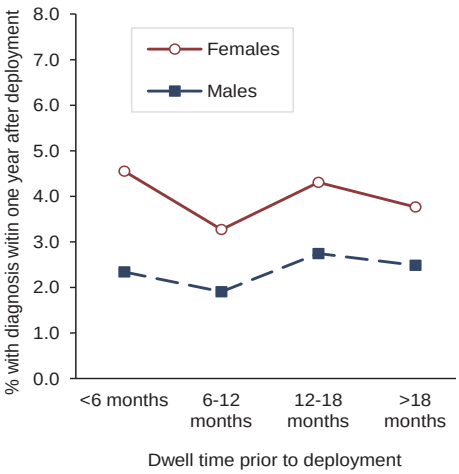
e. Depressive disorder



f.Suicide ideation/self-inflicted injury



g. Psychosocial problems



for this report are undoubtedly incompletely, and in some cases inaccurately, documented in such records. In addition, in spite of recent efforts to reduce stigmas associated with seeking and receiving mental health care, such perceptions persist, particularly among active duty soldiers.[10] Also, this analysis summarizes the experiences of active component members only; the post-deployment mental health problems of active component members differ from those of reserve component members and military service veterans.[11] As such, the numbers and percentages of deployers who are affected by mental disorders that are reported here do not account for the mental health problems of all OEF/OIF/OND veterans.

In conclusion, the findings of this report provide unique insights into mental health risks associated with repeat deployments during a long war fighting period. As such, the findings may be relevant to deployment-related policy-making and post-deployment mental health-related screening, counseling, and treatment practices. However, there are significant limitations to the analysis, and some of the findings are unexpected (e.g., associations between mental disorders after repeat deployments and dwell times prior to the deployments). As such, the findings require more detailed investigation and validation before they are considered reliable and applicable to policy making or practice.

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Animal Bites, Active and Reserve Components, U.S. Armed Forces, 2001-2010

From 2001 to 2010, there were 20,522 diagnoses of animal bites among U.S. military members. Of these, 643 (3.1%) were documented during medical encounters in combat theater. The majority of bites were "dog bites" and occurred more in males, soldiers, and those in infantry and law enforcement occupations. A small proportion of animal bites received documentation of exposure to or post-exposure prophylaxis for rabies virus. Animal bite avoidance and rabies education should be reinforced before members travel or deploy to areas highly endemic for rabies.

Animal bites of humans are common. While most produce only minor injuries, some are disabling, disfiguring, and even life threatening. Also, some bites transmit infections of which the most dangerous is rabies.

Rabies virus is transmitted through exposure to the saliva of an infected animal, most commonly through bite wounds, open cuts in skin, or mucous membranes.[1] In the United States, wild mammal populations (e.g., raccoons, skunks, bats, foxes) serve as reservoirs of rabies. In mammals, including humans, once the virus enters the central nervous system, it causes acute, progressive inflammation of the brain leading to difficulty swallowing, neurologic deficits, abnormal behavior, paralysis, seizures, coma, and in most cases death.[2]

Currently, there is no effective treatment for symptomatic rabies, and progression to death is rapid once symptoms appear. However, if exposure to rabies is identified early, post-exposure prophylactic (PEP) treatment, including wound care and the administration of rabies immune globulin (RIG) and rabies vaccine, are highly effective in preventing progression of the infection and clinical manifestations **(see box page 14)**.[3]

Service members are at risk for animal bites and rabies exposures in the United States and in overseas countries where rabies is endemic. Risk is higher for members of certain military occupations, e.g., veterinary medicine workers, working dog handlers; personnel with occupational rabies exposure risk are provided with pre-exposure prophylaxis.[1-5] This report summarizes numbers and types of animal bites and rabies post-exposure prophylaxis treatments among active and reserve component members from 2001 through 2010.

METHODS

The surveillance period was January 2001 to December 2010. The surveillance population included all individuals who served on active duty status in the active or reserve component of any branch of the U.S. military at any time during the surveillance period. All medical encounters that included diagnostic codes indicative of animal bites (ICD-9-CM: E906.0, E906.1, E906.3, E906.5) were ascertained from electronic records of hospitalizations and

TABLE 1. Number and percentage of animal bites by demographic and military characteristics, active and reserve components, U.S. Armed Forces, 2001-2010

	Outside theater		In theater		Total	
	No.	%	No.	%	No.	%
Total	19,879	100.0	643	100.0	20,522	100.0
Sex						
Female	4,233	21.3	86	13.4	4,319	21.0
Male	15,646	78.7	557	86.6	16,203	79.0
Age Group						
17-19	650	3.3	18	2.8	668	3.3
20-29	10,995	55.3	422	65.6	11,417	55.6
30-39	5,485	27.6	140	21.8	5,625	27.4
40+	2,749	13.8	63	9.8	2,812	13.7
Race-ethnicity						
White, non-Hispanic	14,964	75.3	486	75.6	15,450	75.3
Black, non-Hispanic	1,671	8.4	51	7.9	1,722	8.4
Hispanic	1,702	8.6	63	9.8	1,765	8.6
Asian/Pacific Islander	627	3.2	21	3.3	648	3.2
American Indian/Alaskan Native	315	1.6	7	1.1	322	1.6
Other	600	3.0	15	2.3	615	3.0
Service						
Army	7,714	38.8	399	62.1	8,113	39.5
Navy	3,965	19.9	125	19.4	4,090	19.9
Air Force	5,722	28.8	87	13.5	5,809	28.3
Marine Corps	2,021	10.2	32	5.0	2,053	10.0
Coast Guard	457	2.3	0	0.0	457	2.2
Rank						
Junior enlisted (E1-E4)	7,412	37.3	292	45.4	7,704	37.5
Senior enlisted (E5-E9)	9,100	45.8	282	43.9	9,382	45.7
Junior officers (O1-O3 [W1-W3])	2,007	10.1	55	8.6	2,062	10.0
Senior officers (O4-O10 [W4-W5])	1,360	6.8	14	2.2	1,374	6.7

TABLE 2. Number and percentage of animal bites by type, active and reserve components, U.S. Armed Forces, 2001-2010

	Outside theater		In theater		Total	
	No.	%	No.	%	No.	%
Dog bite (E906.0)	12,730	64.0	325	50.5	13,055	63.6
Rat bite (E906.1)	192	1.0	35	5.4	227	1.1
Other, non-arthropod (E906.3)	4,896	24.6	177	27.5	5,073	24.7
Unspecified animal (E906.5)	2,061	10.4	106	16.5	2,167	10.6
Total	19,879	100.0	643	100.0	20,522	100.0

ambulatory visits in U.S. military and civilian (contracted/purchased care through the Military Health System) medical facilities worldwide, and from records of medical encounters of service members deployed to southwest Asia/Middle East and recorded in the Theater Medical Data Store.

For this analysis, a case was defined as an individual with an inpatient or outpatient diagnosis of "animal bite" in any diagnostic position. Each service member could be counted as a case only once per calendar year; "exposure to rabies", ICD-9-CM: V01.5, and rabies post-exposure prophylaxis treatments from immunization records (i.e., rabies vaccine, rabies immune globulin, and unspecified immune globulin), were ascertained within 90 days of animal bite diagnoses. In each calendar year, animal bite diagnoses reported from deployed settings (inside the military theater or "in theater") were prioritized over those reported from non-deployed settings ("outside theater").

RESULTS

During the 10-year surveillance period, there were 20,522 diagnoses of animal bites among U.S. military members; on average, there were 5.6 animal bite diagnoses per day throughout the period. Of all animal bite diagnoses, 643 (3.1%) were documented during medical encounters in southwest Asia/Middle East **(Table 1)**.

Males accounted for nearly 80 percent of animal bite diagnoses overall and 86.6 percent of those diagnosed inside the military theater. More than one-half (55.6%) of all animal bites, and nearly two-thirds (65.6%) of those diagnosed in theater, affected 20-29 year old service members. White, non-Hispanic service members were affected by approximately three-fourths of all animal bites – both overall and in theater – that were documented on electronic health care records during medical encounters **(Table 1)**.

Army, Navy, and Air Force members were affected by 62.1 percent, 19.4 percent, and 13.5 percent of all animal bites that were evaluated/treated in theater; in non-deployed settings, Army members accounted for relatively fewer (38.8%) and Air Force members relatively more (28.8%) of all cases. More than 80 percent of all animal bite cases, and nearly 90 percent of those diagnosed in theater, affected enlisted members **(Table 1)**.

"Dog bites" accounted for approximately two-thirds (64%) and one-half (50.5%) of all animal bite diagnoses outside of and in theater, respectively. Of note, "rat bites" counted for 5 percent of cases in theater and 1percent of those outside of theater **(Table 2)**.

Among service members deployed in theater, those in "infantry" (n=93) and "law enforcement" (n=61) occupations accounted for the most animal bite diagnoses; members of these groups accounted for approximately one-fourth of all animal bites diagnosed in theater. Similarly, among service members outside of theater,

TABLE 3. Frequency of reports of "exposure to rabies" and rabies post-exposure prophylaxis treatments, by location, active and reserve components, U.S. Armed Forces, 2001-2010

	Outside of theater							In theater						
Follow-up time after animal bite diagnosis		0-7 days		8-30 days		31-90 days			0-7 days		8-30 days		31-90 days	
	Total	No.	%	No.	%	No.	%	**Total**	No.	%	No.	%	No.	%
"Exposure to rabies" (V01.5)	**219**	169	77.2	48	21.9	2	0.9	**1**	0	.	0	.	1	.
Rabies vaccine	**1,681**	1,475	87.7	169	10.1	37	2.2	**117**	99	84.6	17	14.5	1	0.9
Rabies immune globulin	**123**	114	92.7	6	4.9	3	2.4	**25**	25	100.0	0	.	0	.
Unspecified immune globulin	**81**	56	69.1	18	22.2	7	8.6	**0**	0	.	0	.	0	.

those in "law enforcement" (n=1,313) and "infantry" (n=953) occupations accounted for the highest number of animal bite diagnoses; however, these occupational groups accounted for only 11.4 percent of all animal bite diagnoses outside of the theater **(data not shown)**.

Veterinarians and other veterinary medicine workers (e.g., animal care specialists, animal health technicians) accounted for 10 (1.6%) animal bite cases in theater and 423 (2.1%) cases outside of theater during the surveillance period **(data not shown)**.

Of all service members (n=19,879) diagnosed with animal bites outside of theater, health care records for 219 (1.1%) recorded a diagnosis of "exposure to rabies" during a medical encounter within 90 days of the animal bite diagnosis. Most (n=169, 77%) diagnoses of exposure to rabies were documented within one week of the animal bite diagnosis.

Also, among those diagnosed with animal bites outside of theater, 8.5 percent (n=1,681) had a "rabies vaccination" on their immunization record and less than one percent (n=123) received "rabies immune globulin" (RIG) within 90 days of diagnosis of the bite. Most by far of those who were reportedly vaccinated (n=1,475; 87.7%) and who received RIG (n=114, 92.7%) received the respective post-exposure prophylaxis treatments within 1 week of the bite diagnoses **(Table 3)**.

Of all animal bite cases diagnosed in theater, only one was documented as an "exposure to rabies." Yet, of the 643 in-theater animal bite cases, 117 (18.2%) reportedly received "rabies vaccination" and 25 (3.9%) received RIG within 90 days of the bite diagnoses. Most by far of post-exposure prophylaxis treatments were documented during medical encounters within 1 week of the respective bite diagnoses **(Table 3)**.

EDITORIAL COMMENT

This report summarizes numbers and types of animal bites of U.S. military members that were documented during medical encounters from 2001 through 2010; there were an average of 5.6 bites per day throughout the ten year period. Approximately one of thirty animal bites overall were diagnosed in the Southwest Asia/Middle East combat operational theater. Not all animal bites reported in this article pose a risk for rabies.

While this report documents nearly 40 clinically diagnosed animal bite cases of U.S. service members each week, it undoubtedly underestimates the actual numbers of animal bites and rabies post-exposure treatments of U.S. service members. For example, most injuries from animal bites are minor; in such cases, service members are less likely to seek medical

CDC RECOMMENDATIONS for rabies post-exposure prophylaxis (PEP) schedule - United States, 2010[3]

Vaccination status	Treatment	Regimen[a]
Not previously vaccinated	Wound cleansing	Cleanse wound with soap and water. If available, a virucidal agent such as povidine-iodine solution should be used to irrigate the wounds.
	Human rabies immune globulin (HRIG)	Administer 20 IU/kg body weight. If anatomically feasible, the full dose should be infiltrated around the wound(s) and any remaining volume should be administered intramuscularly at an anatomical site distant from vaccine administration. Also, HRIG should not be administered in the same syringe as vaccine, Because HRIG might partially suppress active production of antibody, no more than the recommended dose should be administered.
	Vaccine	Human diploid vaccine (HDVC) or purified chick embryo cell vaccine (PCECV) 1.0 mL, IM (deltoid area[b]), one each on days 0[c], 3, 7, and 14[d].
Previously vaccinated[e]	Wound cleansing	Cleanse wound with soap and water. If available, a virucidal agent such as povidine-idoine solution should be used to irrigate the wounds.
	Human rabies immune globulin (HRIG)	HRIG should not be administered.
	Vaccine	HDCV ro PCECV 1.0mL, IM(deltoid area[b]), one each on days 0[c] and 3.

[a]These regimens are applicable for persons in all age groups, including children.
[b]The deltoid areas the only acceptable site of vaccination for adults and older children. For younger children, the outer aspect of the thigh may be used. Vaccine should never be administered in the gluteal area.
[c]Day 0 is the day dose 1 of vaccine is administered.
[d]For persons with immunosuppression, rabies PEP should be administered using all 5 doses of vaccine on days 0, 3, 7, 14, and 28.
[e]Any person with a history of pre-exposure vaccination with HDCV, PCECV, or rabies vaccine adsorbed (RVA); prior PEP with HDCV, PCECV or RVA; or previous vaccination with any other type of rabies vaccine and a documented history of antibody response to the prior vaccine.

care. However, even minor animal bite injuries can have serious consequences – particularly bites inflicted by wild animals (including bats, foxes, skunks, and raccoons), feral cats and dogs, and pets with unknown rabies vaccination statuses.

Also, animal bites, potential rabies exposures, and rabies PEP are likely even more underreported among U.S. military members serving in Iraq and Afghanistan than elsewhere. Records of medical encounters in theater were not completely reported through TMDS prior to 2007; thus, animal bite diagnoses in theater are not completely accounted for in this report (particularly, prior to 2007). Of note in this regard, during a recent 18-month period, health concerns due to animal bite exposures were reported by more than 5,800 service members and civilians on their post-deployment health questionnaires (unpublished study results).

In this report, dog bites accounted for the largest proportion of animal bites of U.S. service members overall. In the U.S., dog bites of service members are most likely inflicted by pets or military working dogs. Such dogs are generally known to the bite victim and have almost always been vaccinated against rabies. As such, it is not surprising that only a small proportion of all service members who were treated for animal bites outside of theater received rabies post-exposure prophylactic treatment (i.e., rabies vaccination, rabies immune globulin). In contrast, more than 18 percent of service members who were treated for animal bites in theater reportedly received rabies post-exposure prophylactic treatment.

Finally, all service members should be educated regarding the importance of avoiding wild animals (particularly feral dogs and cats), protecting against and seeking medical care for animal bites, and the lethal consequences of rabies. Animal bite avoidance and rabies education should be reinforced before service members travel or deploy to areas highly endemic for rabies. Service members at high risk should be considered for pre-exposure rabies vaccination. Medical care providers at all levels – and particularly those serving in rabies endemic areas – should be knowledgeable and capable of providing pre-exposure rabies immunizations and post-exposure prophylaxis treatments whenever indicated **(Table 4)**.

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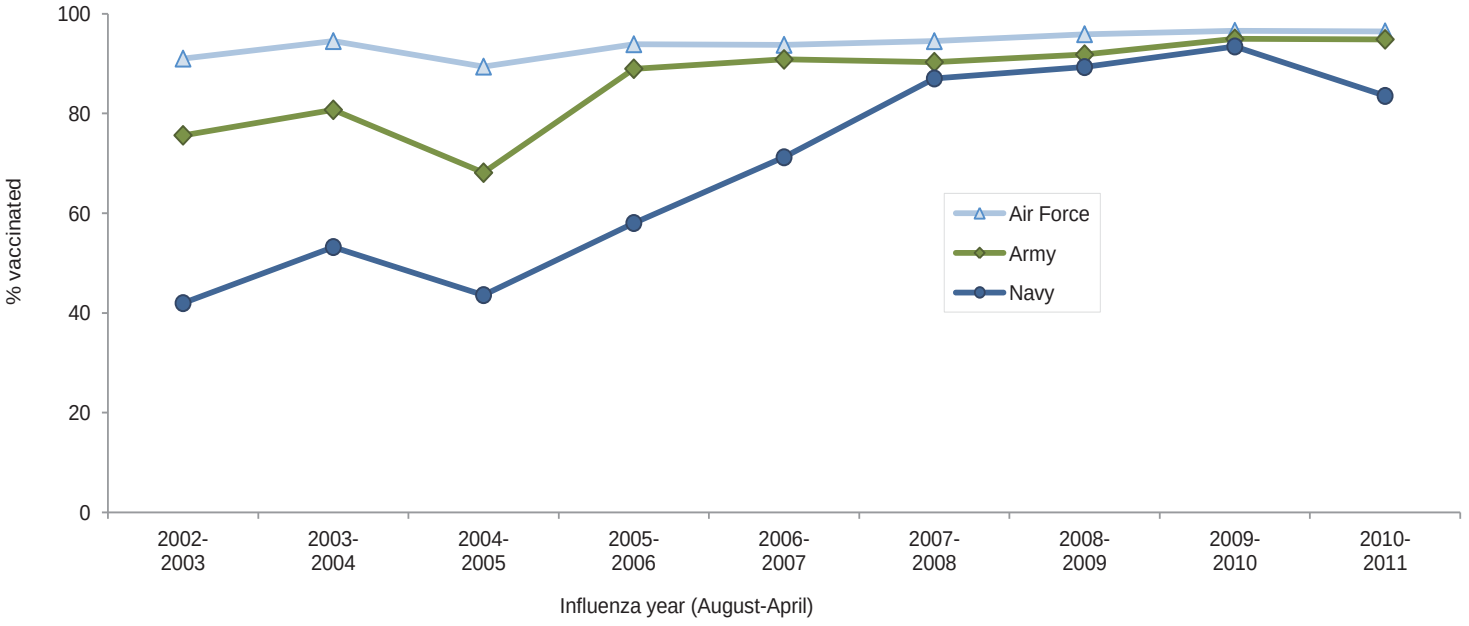
4. Army Regulation 40-905, SECNAVINST 6401.1B, AFI 48-131. Veterinary Health Services. 29 August 2006. Accessed 03 October 2011 at http://www.apd.army.mil/pdffiles/r40_905.pdf.
5. Army Regulation 40-562, BUMEDINST 6230.15A, AFJI 48-110, CG COMDTINST M6230.4F. Immunizations and Chemoprophylaxis. 4-16. 29 September 2006. Accessed 03 October 2011 at http://www.vaccines.mil/documents/969r40_562.pdf.

Surveillance Snapshot: Influenza immunization among healthcare workers

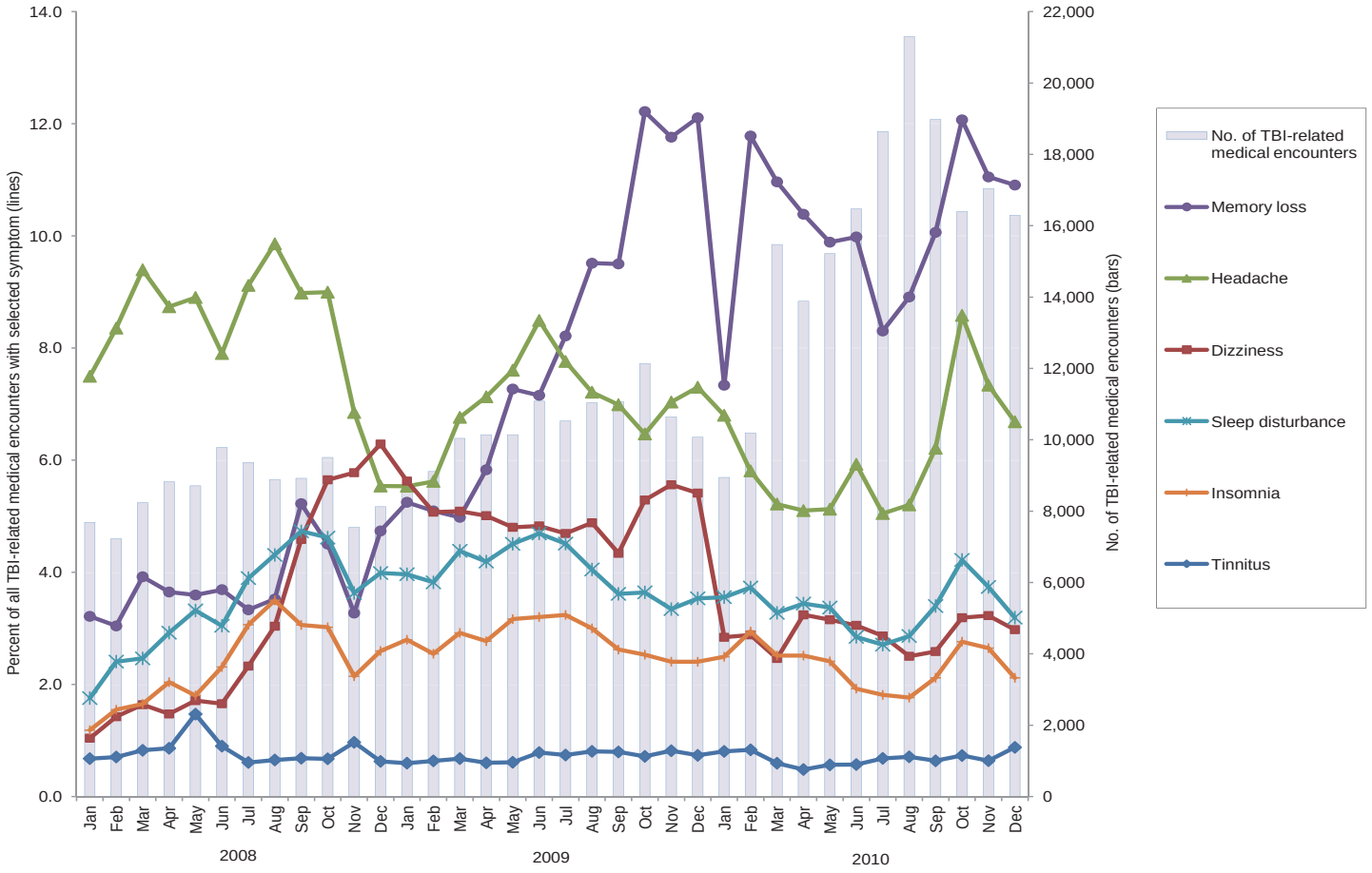
Percentage of healthcare specialists and healthcare officers (excluding veterinary) with records of influenza vaccination from 1 August to 30 April, by year and military service, active component, U.S. Armed Forces, August 2002-April 2011



Surveillance Snapshot: Symptoms Diagnosed During Traumatic Brain Injury-Related Medical Encounters, Active Component, U.S. Armed Forces, January 2008-December 2010

In 2008, the Department of Defense disseminated traumatic brain injury (TBI)-related medical coding guidance. The guidance listed specific symptoms that should be documented in the medical records of service members who are treated for TBI or TBI-related complaints. Since January 2008, there have been between 7,230 and 21,302 traumatic brain injury-related medical encounters[a] of U.S. service members per month (when restricted to one TBI-related encounter per person per day). Of the records of these encounters, between 3.0% (in February 2008) and 12.2% (in October 2009) included diagnoses of "memory loss" and between 5.1% (in July 2010) and 9.9% (in August 2008) included diagnoses of "headache".

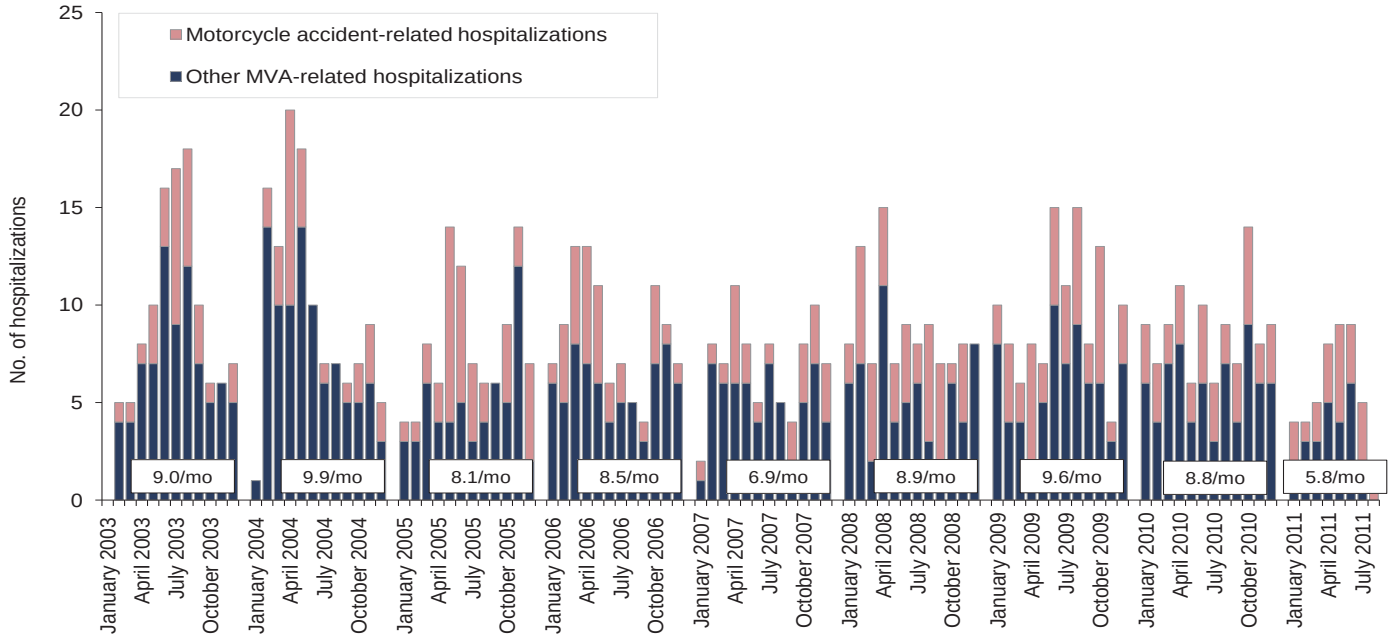
Proportions of all TBI-related medical encounters[a] (range: 7,230-21,302 per month) with diagnoses of selected symptoms, by month, active component, U.S. Armed Forces, January 2008-December 2010



[a]Traumatic brain injury-related medical encounters include hospitalizations and ambulatory visits routinely reported to the Defense Medical Surveillance System and Theatre Medical Data Store with one of the following diagnoses (ICD-9-CM) in any diagnostic position: Post concussion syndrome (310.2), skull fracture, (800.xx-801.xx, 803.xx-804.xx), concussion (850), cerebral laceration and contusion (851) intracranial hemorrhage following injury (852.xx-853.xx) intracranial injury of other and unspecified nature (854.xx), late effect of intracranial injury without mention of skull fracture (907.0), injury to optic chiasm/pathways or visual cortex (950.1- 950.3), unspecified head injury (959.01) or personal history of TBI (V15.5_1-9, V15.5_A-F, V15.52_0-9, V15.52_A-F, V15.59_1-9, V15.59_A-F).

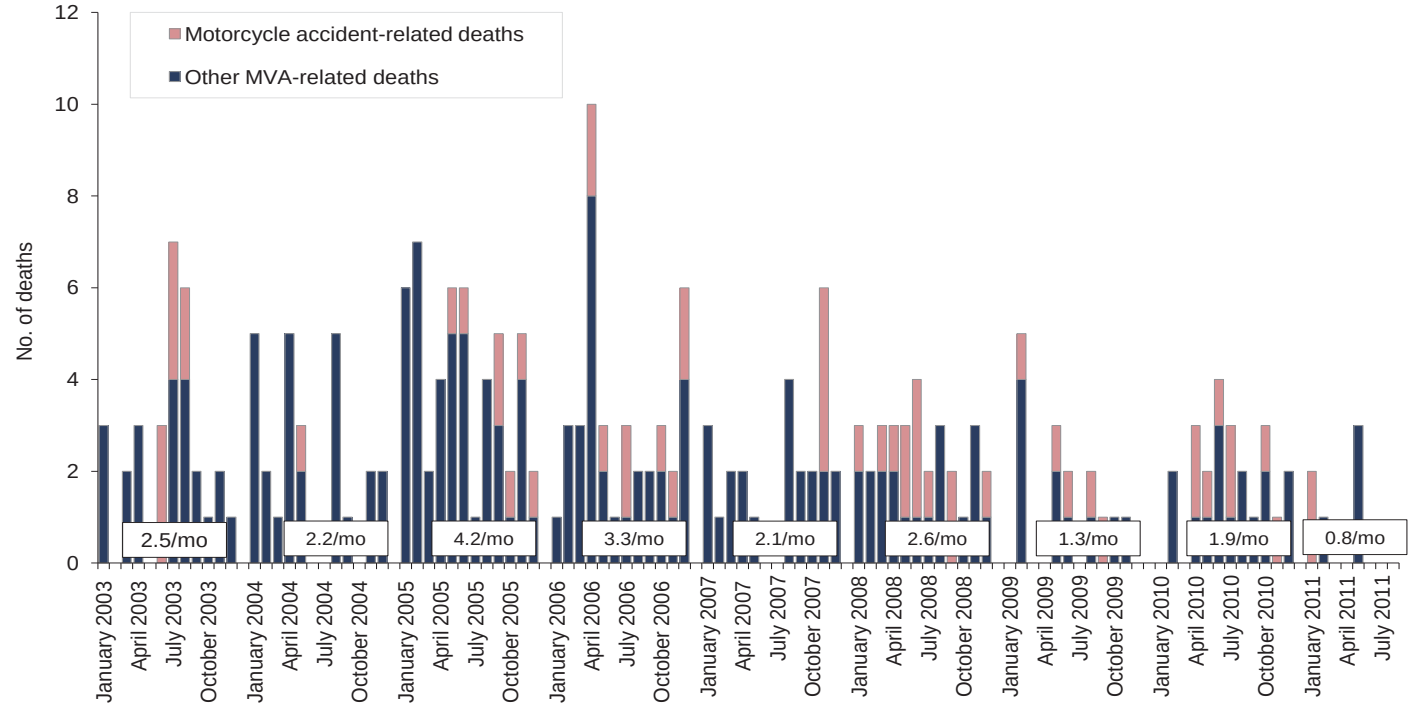
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - August 2011 (data as of 26 September 2011)

Motor vehicle accident-related hospitalizations (outside of the operational theater) (ICD-9-CM: E810-E825; NATO Standard Agreement 2050 (STANAG): 100-106, 107-109, 120-126, 127-129)



Note: Hospitalization (one per individual) while deployed to/within 90 days of returning from OEF/OIF/OND. Excludes accidents involving military-owned/special use motor vehicles. Excludes individuals medically evacuated from CENTCOM and/or hospitalized in Landstuhl, Germany within 10 days of a motor vehicle accident-related hospitalization.

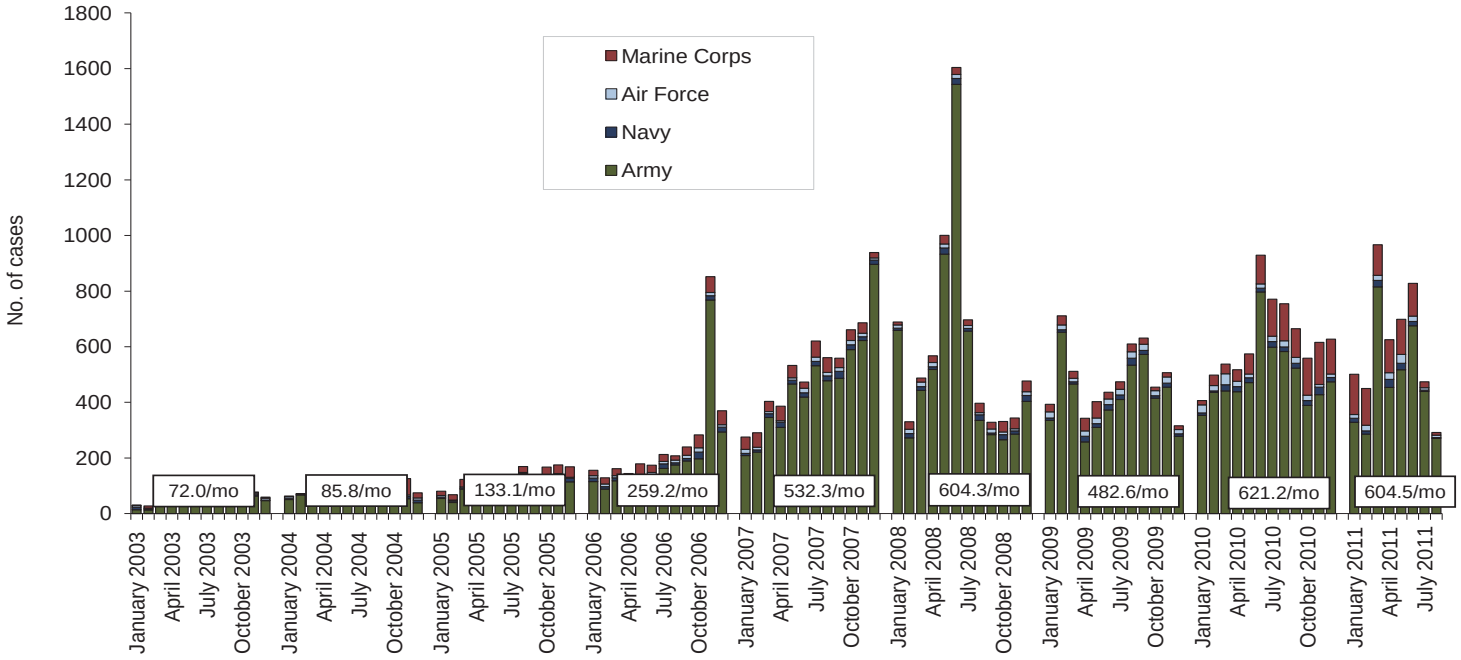
Motor vehicle accident-related deaths (outside of the operational theater) (per the DoD Medical Mortality Registry)



Reference: Armed Forces Health Surveillance Center. Motor vehicle-related deaths, U.S. Armed Forces, 2010. *Medical Surveillance Monthly Report (MSMR)*. Mar 11;17(3):2-6.
Note: Death while deployed to/within 90 days of returning from OEF/OIF/OND. Excludes accidents involving military-owned/special use motor vehicles. Excludes individuals medically evacuated from CENTCOM and/or hospitalized in Landstuhl, Germany within 10 days prior to death.

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 -August 2011 (data as of 22 September 2011)

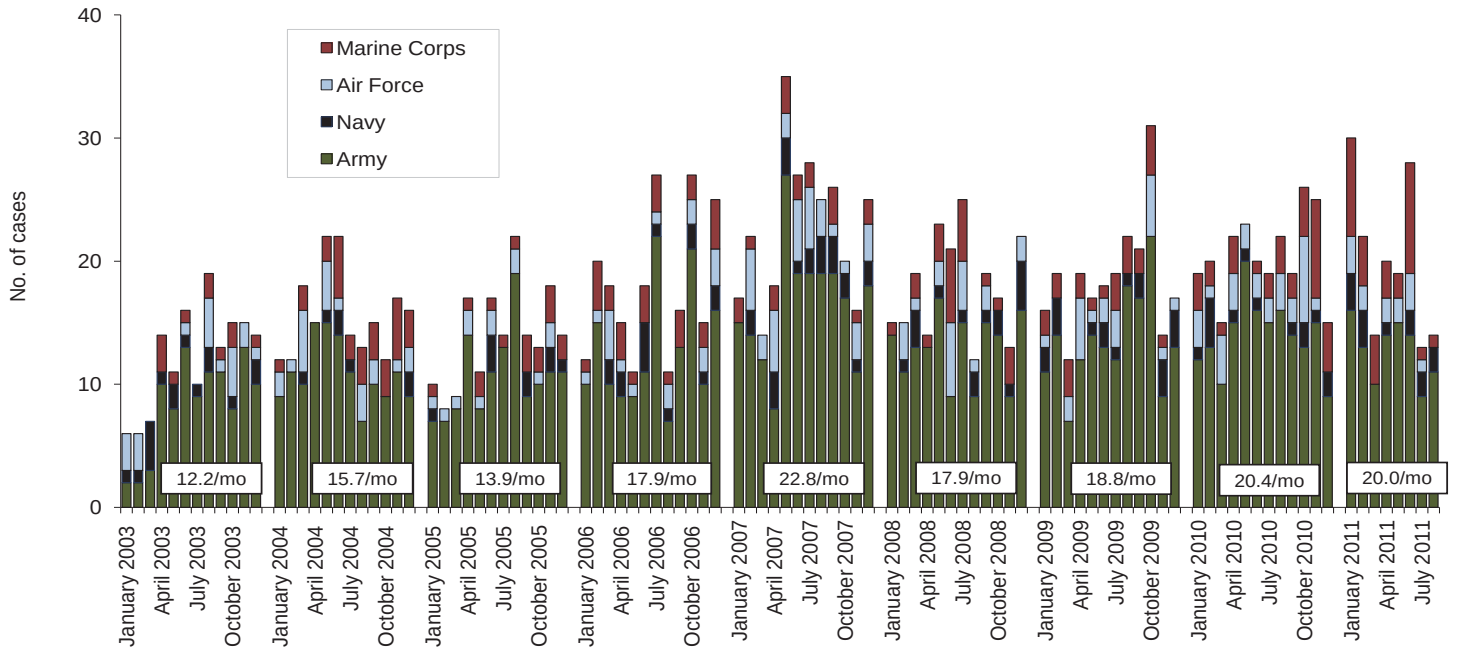
Traumatic brain injury (ICD-9: 310.2, 800-801, 803-804, 850-854, 907.0, 950.1-950.3, 959.01, V15.5_1-9, V15.5_A-F, V15.52_0-9, V15.52_A-F, V15.59_1-9, V15.59_A-F)[a]



Reference: Armed Forces Health Surveillance Center. Deriving case counts from medical encounter data: considerations when interpreting health surveillance reports. *MSMR*. Dec 2009; 16(12):2-8.

[a]Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF. (Includes in-theater medical encounters from the Theater Medical Data Store [TMDS] and excludes 3,261 deployers who had at least one TBI-related medical encounter any time prior to OEF/OIF).

Deep vein thrombophlebitis/pulmonary embolus (ICD-9: 415.1, 451.1, 451.81, 451.83, 451.89, 453.2, 453.40 - 453.42 and 453.8)[b]

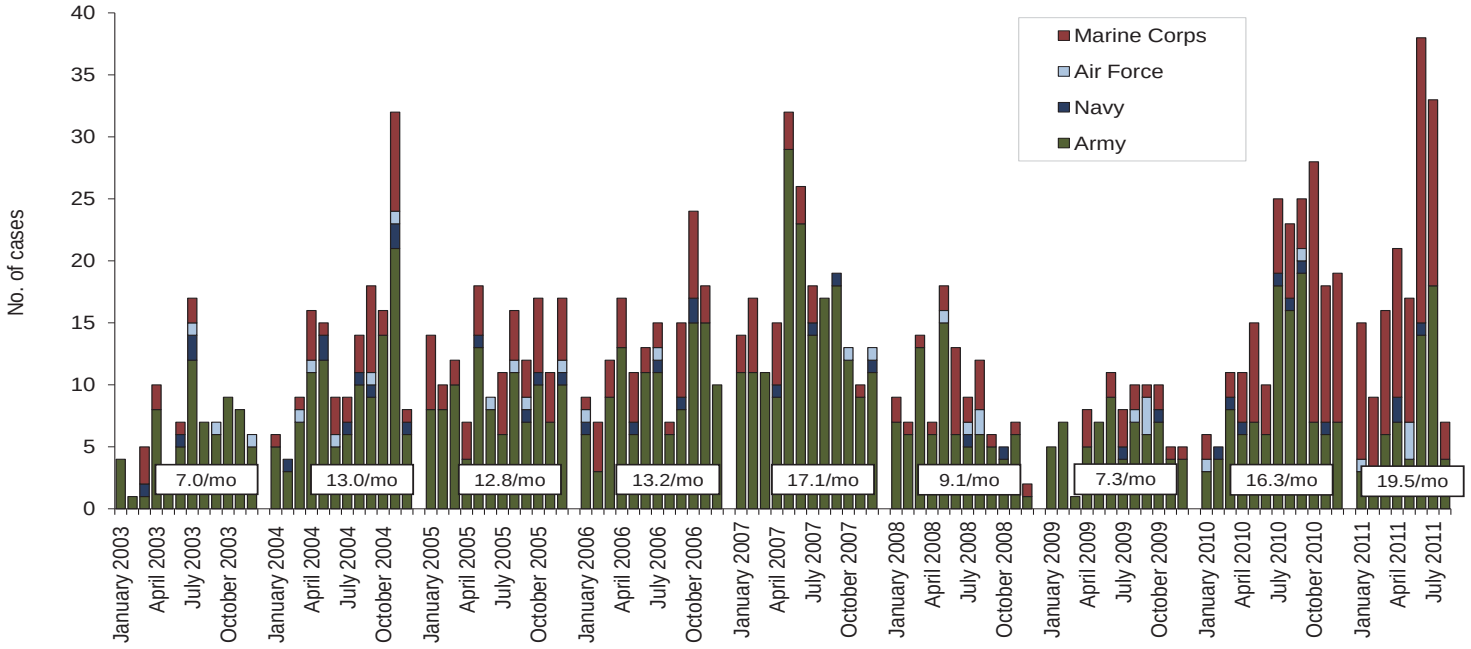


Reference: Isenbarger DW, Atwood JE, Scott PT, et al. Venous thromboembolism among United States soldiers deployed to Southwest Asia. *Thromb Res*. 2006;117(4):379-83.

[b]One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 90 days of returning from OEF/OIF.

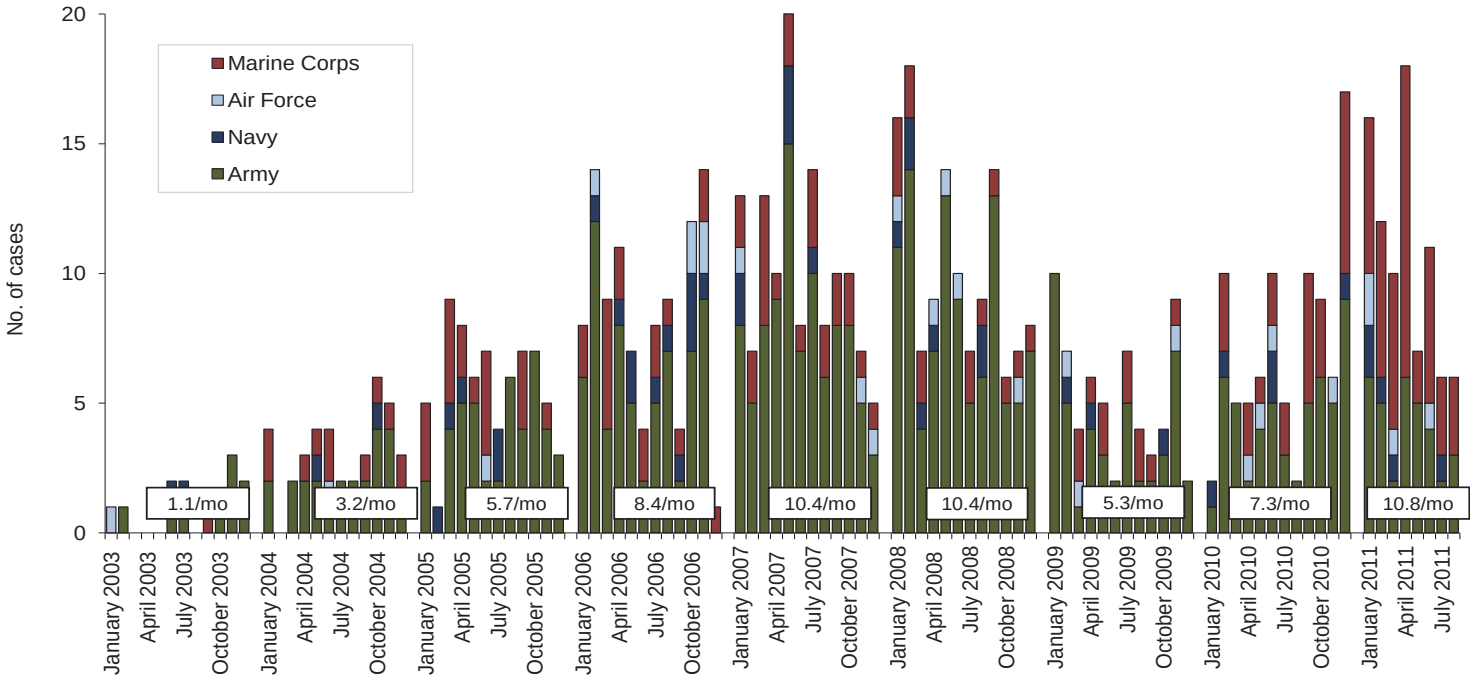
Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003 - August 2011 (data as of 22 September 2011)

Amputations (ICD-9-CM: 887, 896, 897, V49.6 except V49.61-V49.62, V49.7 except V49.71-V49.72, PR 84.0-PR 84.1, except PR 84.01-PR 84.02 and PR 84.11)[a]



Reference: Army Medical Surveillance Activity. Deployment-related condition of special surveillance interest: amputations. Amputations of lower and upper extremities, U.S. Armed Forces, 1990-2004. *MSMR*. Jan 2005;11(1):2-6.
[a]Indicator diagnosis (one per individual) during a hospitalization while deployed to/within 365 days of returning from OEF/OIF.

Heterotopic ossification (ICD-9: 728.12, 728.13, 728.19)[b]



Reference: Army Medical Surveillance Activity. Heterotopic ossification, active components, U.S. Armed Forces, 2002-2007. *MSMR*. Aug 2007; 14(5):7-9.
[b]One diagnosis during a hospitalization or two or more ambulatory visits at least 7 days apart (one case per individual) while deployed to/within 365 days of returning from OEF/OIF.

Medical Surveillance Monthly Report (MSMR)
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Silver Spring, MD 20904

THE MEDICAL SURVEILLANCE MONTHLY REPORT (MSMR), in continuous publication since 1995, is produced by the Armed Forces Health Surveillance Center (AFHSC). The MSMR provides evidence-based estimates of the incidence, distribution, impact and trends of illness and injuries among United States military members and associated populations. Most reports in the MSMR are based on summaries of medical administrative data that are routinely provided to the AFHSC and integrated into the Defense Medical Surveillance System for health surveillance purposes.

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ISSN 2158-0111 (print)
ISSN 2152-8217 (online)
Printed on acid-free paper